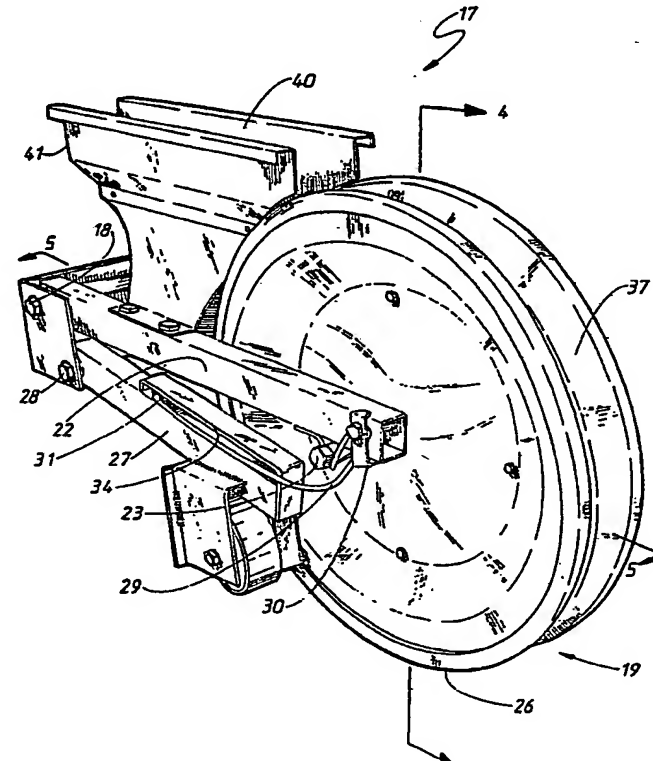




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<p>(54) Title: <b>GOLF BALL RETRIEVER</b></p> <p>(57) Abstract</p> <p>A collection device for golf balls or the like includes a trailerable frame (11, 12) having a plurality of parallel positioned rotating discs or the like (19), each secured to respective independent axles (23). Each axle (23) is secured to a respective vertically pivotable frame (22). Each disc has a continuous peripheral housing (37) which engages golf balls directed thereto by guide means (25) aligned with each housing (37). The housing (37) may be a U-shaped channel about the periphery of the disc (19). Golf balls may be extracted from the housing (37) by a finger plate (38) and directed to a storage container (13) by a chute (40). The guide means (25) may be vertically pivotally mounted to the axle frame (22) and may include guide wheels (50) so that the guide means (25) can follow undulations in the ground independently of the rotating discs (19).</p> 		

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GOLF BALL RETRIEVERFIELD OF THE INVENTION

THIS INVENTION relates to an improved golf ball retriever of the type employing a plurality of independent golf ball collectors, each collector having a collector wheel adapted to traverse a surface and automatically collect golf balls from the surface while each collector wheel independently follows undulations in the surface.

BACKGROUND ART

US Patent No. 2,605,005 describes a golf ball retriever having a plurality of golf ball collectors pivotally attached to a trailerable frame.

Each collector includes a pivot arm one end of which is pivotally connected to the frame. A collector wheel is mounted for rotation on the other end of the pivot arm.

Two semi-circular golf ball guide channels are secured to the pivot arm concentrically with and on each side of the collector wheel. Each channel has a guide mouth located at an end adjacent the surface contacting periphery of the collector wheel.

Golf balls on the surface are directed into the guide mouth by guide arms extending from the guide mouth. In plan view the guide arms diverge outwardly forming a V-shape in front of the guide mouth.

The guide channels, guide mouth and guide arms are rigidly fixed to the pivot arm and follow the surface contacting periphery of the wheel as it follows undulations

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in the surface.

Golf balls are physically rolled around the guide channel by the rotating wheel.

Notwithstanding that the collector employed in this retriever are of very complex construction the guide arms are spaced from the surface contacting periphery of the collector wheel that is where the surface undulations are being followed. As a result the guide arms tend to gouge the surface when the collector wheel passes into a hollow in the surface.

In addition the collectors are spaced so far apart that the guide arms can actually pass over balls which are located in hollows.

US Patent No. 2, 792, 955 describes a golf ball retriever having golf ball collectors which physically roll golf balls around a guide channel in similar fashion to the collector of 2, 605, 005.

In this case however, the collectors are located closer together. Again a pivot arm is pivotally connected to a frame but in this case a disc is rotatably mounted on a shaft at the other end of the pivot arm. A pneumatic wheel is mounted for rotation on the shaft at a laterally spaced location from the disc. The pneumatic wheel is of smaller diameter than the disc.

A peripheral guide channel is spaced radially and laterally from the pneumatic wheel. The guide channel has a

guide mouth located adjacent and extending forwardly of the surface contacting periphery of the disc. The guide channel is fixed relative to the disc and the pneumatic wheel.

Golf balls entering the guide channel are rolled around the channel by the pneumatic wheel.

This retriever is also of very complex construction involving many parts which are easily damaged and difficult to repair. In addition the guide mouth is spaced from the surface connecting periphery of the disc and is apt to gouge the surface. Particles removed from the surface can clog the guide channel and reduce the efficiency of the retriever. The narrow discs can also damage the surface.

U.S. Patents Nos. 2,658,637 and 2,656,061 describe golf ball retrievers where the guides deflect when they collide with undulations in a surface. However these collisions cause damage to the surface.

Thus the aforementioned retrievers fail to adequately track an undulating surface and in particular the guide in each case fails to track the surface and is apt to cause damage to the surface.

It is therefor a principal object of the present invention to provide a golf ball retriever which overcomes or substantially alleviates the deficiencies of the prior art.

With the foregoing and other objects in view the present invention resides in one broad aspect in a golf ball retriever for traversing a surface, the retriever having a

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main frame and at least one collector wheel rotatably mounted to a subframe, said subframe being mounted to said main frame to enable the collector wheel to track undulations in the surface, a respective guide located in front of each collector wheel and spaced therefrom to direct golf balls to the associated collector wheel as the retriever traverses the surface, the guide being mounted to the subframe or the main frame and being adapted to track undulations in the surface.

Advantageously two or more collector arrays can be pivotally connected together. In one particularly advantageous form the retriever includes locking means to hold the collector wheels in a transport position from the surface. Preferably the locking means comprises a bar positionable between the surface and the collector wheel.

The collector wheel can be biased against the surface so that the periphery of the wheel follows the surface. The wheel can be biased under its own weight or by biasing means such as a spring. Preferably however the collector wheel is rotatably mounted at the end of a collector wheel pivot arm so that it is biased against the surface by its own weight. The other end of the collector wheel pivot arm is preferably adapted for pivotal connection to a collector wheel frame member.

The collector wheel can be of unitary or multi-part construction. Where the wheel is of unitary construction the golf ball receiver can be formed as part of a rim portion of

the wheel. Preferably however, the wheel is of multipart construction. Advantageously, the wheel has a hub and a rim. Preferably the hub is made from two disc-like members having spaced peripheral edges forming the rim of the wheel. The rim can be of rigid construction in full or in part. Preferably however, the rim is made at least in part from a flexible or resilient material.

The golf ball receiver can be formed as part of the collector wheel rim or as a removable tyre securable to the rim.

Where the golf ball receiver is formed as part of the rim, the rim preferably includes a continuous peripheral channel or open slot adapted to fictionally engage a golf ball. The channel walls can be roughened or striated to improve the frictional engagement of the channel with the golf ball. Advantageously, the channel walls converge inwardly from the periphery so golf balls wedge in the channel.

Where the golf ball receiver is formed as a removable tyre, the tyre can fit into a channel in the rim or over the spaced edges of the discs. Advantageously the tyre is a hoop of thin walled resilient material having a general U-shape cross-section. Preferably the inner walls of the tyre converge inwardly so that golf balls can wedge between the walls.

Where the golf ball receiving means grasps or

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fictionally engages a golf ball the collector further includes a golf ball dislodger or ejector. The dislodger can be a stop which engages golf balls to dislodge the golf balls from the collector so the golf balls fall into a receptacle. Preferably the dislodger is a finger plate extending tangentially of the upper periphery of the wheel. Where a channel is employed the finger plate can extend into the channel. Advantageously, the finger plate is V-shaped and communicates with a delivery chute along which golf balls roll before falling into a receptacle.

The golf ball guide can be biased toward the surface by its own weight or by a biasing means such as spring. Preferably however, the golf ball guide is mounted on the end of a guide pivot arm so that it is biased under its own weight. Advantageously the guide bias is provided by a combination of its own weight and a separate biasing means such as a spring. The other end of the guide pivot arm is preferably adapted for pivotal connection to a guide frame member. The guide frame member can be the collector wheel pivot arm, the collector wheel frame member or another frame member. The golf ball guide can include a single guide member or a plurality of guide members. Preferably the golf ball guide includes a guide mouth alienable with the golf ball receiver. Preferably guide arms converge to the guide mouth.

The peripheral bearing surface of the golf ball



guide can be in contact with surface being traversed part of the time or can follow the surface continuously. In this latter form a wheel or roller can be employed. Preferably the golf ball guide can include at least one guide wheel which rides over the surface being traversed. Preferably two wheels are employed. The guide wheels can be located on either side of the guide mouth or can define the guide mouth. In one form the guide is in the form of two opposed frusto-conical rollers having their narrow ends located adjacent the guide mouth. In another form upright guide plates are located in front of guide wheels. The guide plates are preferably spaced from the surface being traversed and move up or down as the guide wheels follow the surface.

In order that the invention may be more readily understood and put into practical effect reference will now be made to the accompanying drawings and wherein:

Fig 1 is a plan view of a golf ball retriever constructed in accordance with the present invention.

Fig 2 is a front perspective view illustrating a preferred golf ball collector according to the invention.

Fig 3 is a rear perspective view of the golf ball collector of Fig 2.

Fig 4 is a vertical transverse cross-section through the collector of Figs 2, 3.

Fig 5 is a longitudinal cross-section through the centre of the collector of Figs 2 and 3 and

Figs 6 and 7 are cutaway perspective views illustrating a further preferred embodiment of a retriever according to the present invention.

Referring to the drawings and initially to Fig 1, there is illustrated in plan view a golf ball retriever 10. In the illustrated embodiment the golf ball retriever 10 is trailerable behind a towing vehicle (not shown), it will be appreciated however, that the retriever of the invention can be towed or pushed across a surface or can extend from a motive vehicle boom.

The retriever 10 includes a draw bar 11 and a main frame 12. Five receptacles 13 for collected golf balls are mounted on the main frame 12. Wheels 14 are mounted at the ends of an axle 15. The main frame 12 includes a rear rail 16 extending across the retriever 10.

A plurality of golf ball collectors 17 are pivotally connected to the rail 16 at pivot connections 18 for independent pivotal movement relative to the rail 16. Each collector 17 includes a collector wheel 19 located behind a golf ball guide 20 and a golf ball dislodger 21. A top section of the retriever 10 has been cut away for the purpose of illustrating the golf ball guides 20. The collector wheels are rotably mounted on the end of collector wheel pivot arms 22.

One preferred golf ball collector will be described below with respect to Fig 2-5 of the drawings.

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Referring to Figs 2 and 3 there is illustrated respective front and rear perspective views of a golf ball collector 17. The golf ball collector 17 is adapted to traverse a surface and retrieve golf balls from the surface and transfer the golf balls to a receptacle. The collector wheel 19 is rotatably mounted at the end of collector wheel pivot arms 22 on a collector wheel shaft 23. The collector wheel 19 is biased against a surface by its own weight and moves up and down about pivotal connection 18 mounted on frame member 24 and thus the collector wheel 19 follows undulations in a surface being traversed.

A golf ball guide 25 is located in front of the surface contacting periphery 26 of the collector wheel 19. The golf ball guide 25 is mounted on golf ball guide pivot arms 27 which pivot on a pivot shaft 28 mounted on frame member 24.

The golf ball guide is biased against the surface being traversed by a combination of its own weight and biasing spring 29. Each biasing spring 29 is fixed at its one end 30 to the collector wheel pivot arm 22. The other end 31 of the biasing spring is fixed to a plate 32 (this is more clearly shown in Fig 5). A spring roller 33 is captive in spring roller housing 34 and rolls along spring roller housing 34 as the guide pivot arm 27 pivots about 28. Thus, the spring roller housing limits the travel of the guide pivot arm 27 relative to the collector wheel pivot arm 22.

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In the illustrated The guide bearing surface is provided by guide wheels 50.

The golf ball guide 25 includes guide arms 35 which converge to a guide mouth 36 in plate 32. The plate 32 is mounted only to the spring ends 31 and is free to move as roller 33 moves back and forth in the spring roller housing 34. In this way the guide mouth 36 is maintained in substantial alignment with the periphery 26 of the collector wheel 19.

The collector wheel includes a golf ball receiver which in this case is a channelled rim 37 in which golf balls passing through the guide mouth are wedged. A golf ball dislodging means in the form of finger plate 38 of V-cross-section (On one end of which is seen at 39) extends into the channel 37. Golf balls wedged in the channel 37 are dislodged by the finger 38 and then roll along a chute 40. Chute end 41 is normally located above a basket 53 (see Figs 6 and 7) in which the collected golf balls are stored.

The frame member 24 includes holes 42 so that the collector 17 can be attached to the rear rail 16 of the main frame 12 (see Fig. 1).

Referring to Fig. 4 there is illustrated a cross section through 4-4 of the collector 17 of Figs. 2 and 3 and like numerals have been used to illustrate like features. As can be seen the collector wheel is of three part construction. Two disc-like members 42 having spaced

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peripheral edges 43 over which a removable tyre 44 is mounted are assembled to form the collector wheel. The tyre 44 is made from resilient material and forms the channel 37. The channel walls 45 are inwardly convergent so golf balls wedge in the channel 37. Bearings 46 are housed in the hub 47.

The disc-like members are secured together by spaced fastening bolts 48 (see also Figs. 2 and 3). In order to replace the tyre 44 the shaft 23 is removed and the bolts 48 removed so that the disc-like members can be manipulated and the tyre 44 exchanged.

Referring to Fig. 5 which is a cross-section through 5-5 of the collector of Fig. 3 the operation of the collector will now be described. Like numerals have been used to illustrate like features.

As can be seen the collector 17 is illustrated moving up a slight incline 49. The golf ball guide 25 is located at a higher location on the incline than the periphery 26 of the collector wheel 19. The guide wheels 50 are therefore following undulations in the surface which are spaced from the undulations being followed by the collector wheel 19.

The guide 25 is shown approaching a golf ball 51 the passage of which is shown in dot-dash outline. After the golf ball 51 passes through the guide mount 36 it is wedged in the channel 37 and carried upwardly, as shown at position 52

FIG. 5

toward finger plate 38. The finger plate 38 then dislodges the golf ball from the channel 37 whereafter it rolls along chute 40 as shown at position 53 to fall into a basket (not shown).

The arrangement of the plate 32, spring 29, spring roller 33 and spring roller housing 34 is such as to maintain the relative orientation of the guide mouth 36 with respect to the channel 37. Thus the guide wheels 51 can ride over undulations while the guide mouth maintains a substantially constant guiding geometry with the channel 37.

Referring now to Figs. 6 and 7 there is illustrated in cutaway perspective views a further embodiment of the present invention. The respective ends only of a retriever are shown but it will be realised that a number of such retrievers can be mounted end on end in a cascade. Fig. 6 illustrates a golf ball retriever 10 in a retrieving position. That is, the array of collector wheels 19 are in contact with the surface being traversed. As can be seen in Fig. 6 a bar 54 extends along the rear of the retriever. Bar extensions 55 at each end of the retriever (only one is shown in Fig. 6) allow the bar to be moved from the position illustrated in Fig. 6 to the position illustrated in Fig. 7. Likewise the collectors 17 can be pivoted upwardly about their pivotal connection to rail 16 into the position illustrated in Fig. 7 so that the collectors 17 are held away from the surface being traversed by the bar 54. The position

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of collectors 17 as illustrated in Fig. 7 is a transport position so that the retriever can be towed at speed.

A number of golf ball retrievers of the type shown in Figs. 6 and 7 can be connected side by side in a cascade and to facilitate this connection, additional forward supporting wheels 56 and end brackets 57 are provided. Golf ball deflectors 58 are positioned forward of the wheels 56. A suitable linkage (not shown) to enable the retrievers to pivot relative to each other can be employed between opposing sets of brackets 57.

It is to be noted that the location of wheels 14 in Figs. 6 and 7 are co-axial with the shafts of the collector wheels 19. As a result the turning action of the retriever is improved and less damage to greens is caused by the collector wheels when the retriever is turned.

Whilst the above has been given by way of illustrative example of the invention, modifications and improvements to the invention will be apparent to those skilled in the art without departing from the broad scope and ambit of the invention as defined in the appended claims.

CLAIM

1. A collection device for use in collecting golf balls or the like including a trailable frame, said trailable frame having a plurality of parallel positioned rotating discs or the like, said rotating discs being secured to independent axles, each said axle being secured to a frame, each said frame being vertically pivotable, each said rotating disc or the like having a continuous peripheral housing, said housing being aligned with guide means, said guide means being adapted to direct golf balls or the like into said housing, said directed golf balls being engaged in said housing and being transferred thereby into a storage container.



## AMENDED CLAIMS

[received by the International Bureau on 22 August 1988 (22.08.88)  
original claim 1 cancelled; new claims 1-9 inserted (2 pages)]

1. A golf ball retriever for traversing a surface and collecting golf balls from the surface, the retriever having a main frame and at least one collector wheel rotatably mounted to a subframe, said subframe being mounted to said main frame to enable the collector wheel to track undulations in the surface, a respective guide located in front of each collector wheel and spaced therefrom to direct golf balls to the associated collector wheel as the retriever traverses the surface, the guide being mounted to the subframe or the main frame and being adapted to track undulations in the surface.
2. A golf ball retriever as defined in claim 1, wherein the subframe comprises a wheel pivot arm, and the collector wheel is rotatably mounted at one end of the wheel pivot arm, the other end of the wheel pivot arm being pivotally mounted to the main frame, the guide being pivotally mounted to the wheel pivot arm or the main frame via a guide pivot arm.
3. A golf ball retriever as defined in claim 2, wherein the wheel pivot arm comprises a pair of spaced wheel pivot arm members and the collector wheel is mounted on an axle extending between the wheel pivot arm members.
4. A golf ball retriever as defined in claim 2 or 3, wherein the collector wheel comprises a hub and a rim, said rim having an endless peripheral channel for frictionally engaging golf balls.

5. A golf ball retriever as defined in claim 4, wherein a removable tyre is mounted in the rim, the removable tyre comprising a hoop of resilient material having a generally V-shaped radial cross-section in which golf balls can be frictionally engaged.

6. A golf ball retriever as defined in claim 2 or claim 3 wherein the guide includes at least one wheel or roller mounted on the end of the guide pivot arm to track undulations in the surface.

7. A golf ball retriever as defined in claim 6, wherein the guide includes two wheels spaced transversely to the direction of retriever travel across the surface.

8. A golf ball retriever as defined in claim 7, wherein the guide includes a guide plate mounted in front of each wheel and a guide mouth aligned with the collector wheel.

9. A golf ball retriever as defined in claim 6 wherein the guide includes a guide plate mounted in front of the or each wheel or roller, the plate being angled to the transverse and adapted to move with the wheel or roller as it tracks the surface and to direct golf balls to the collector wheel.

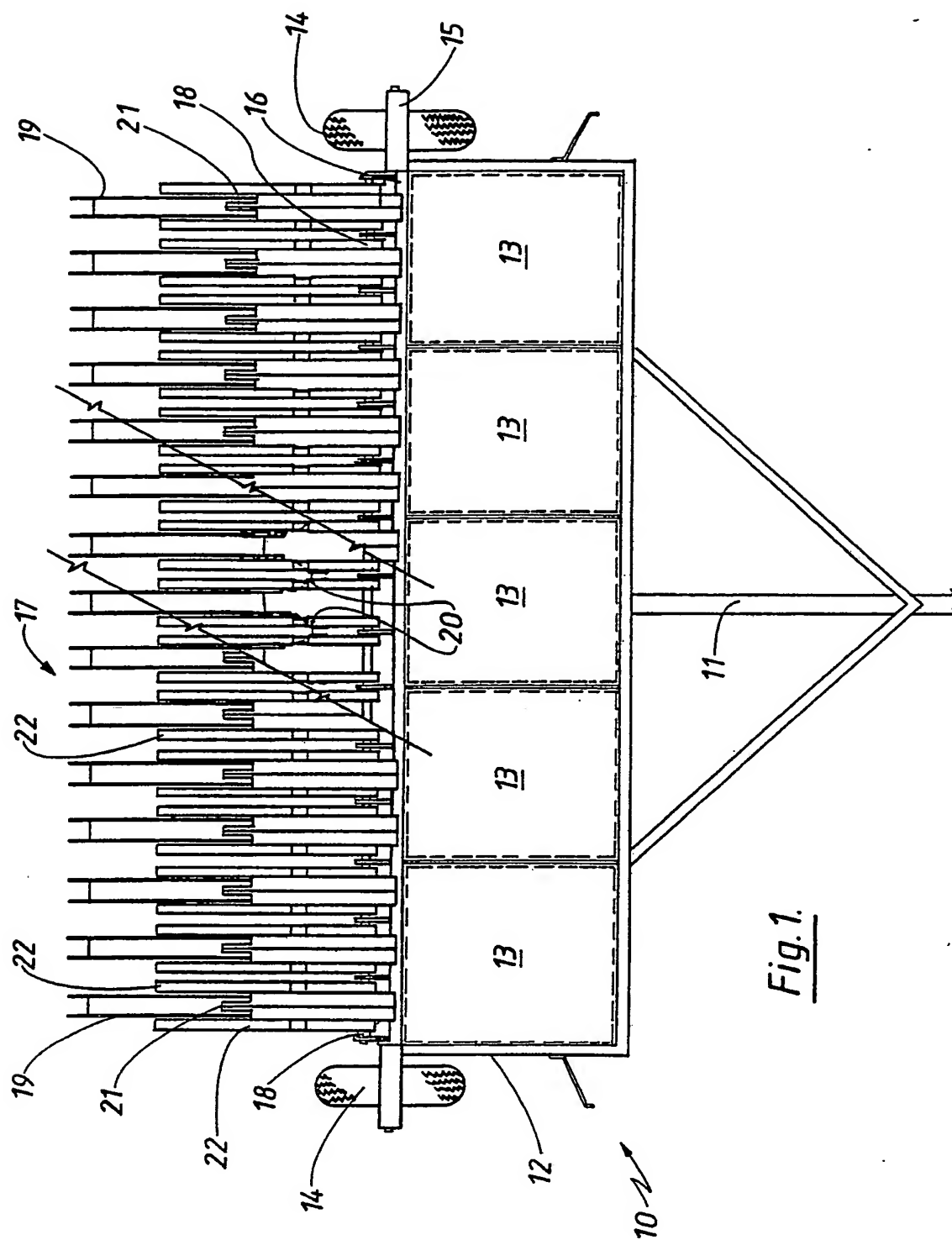


Fig. 1.

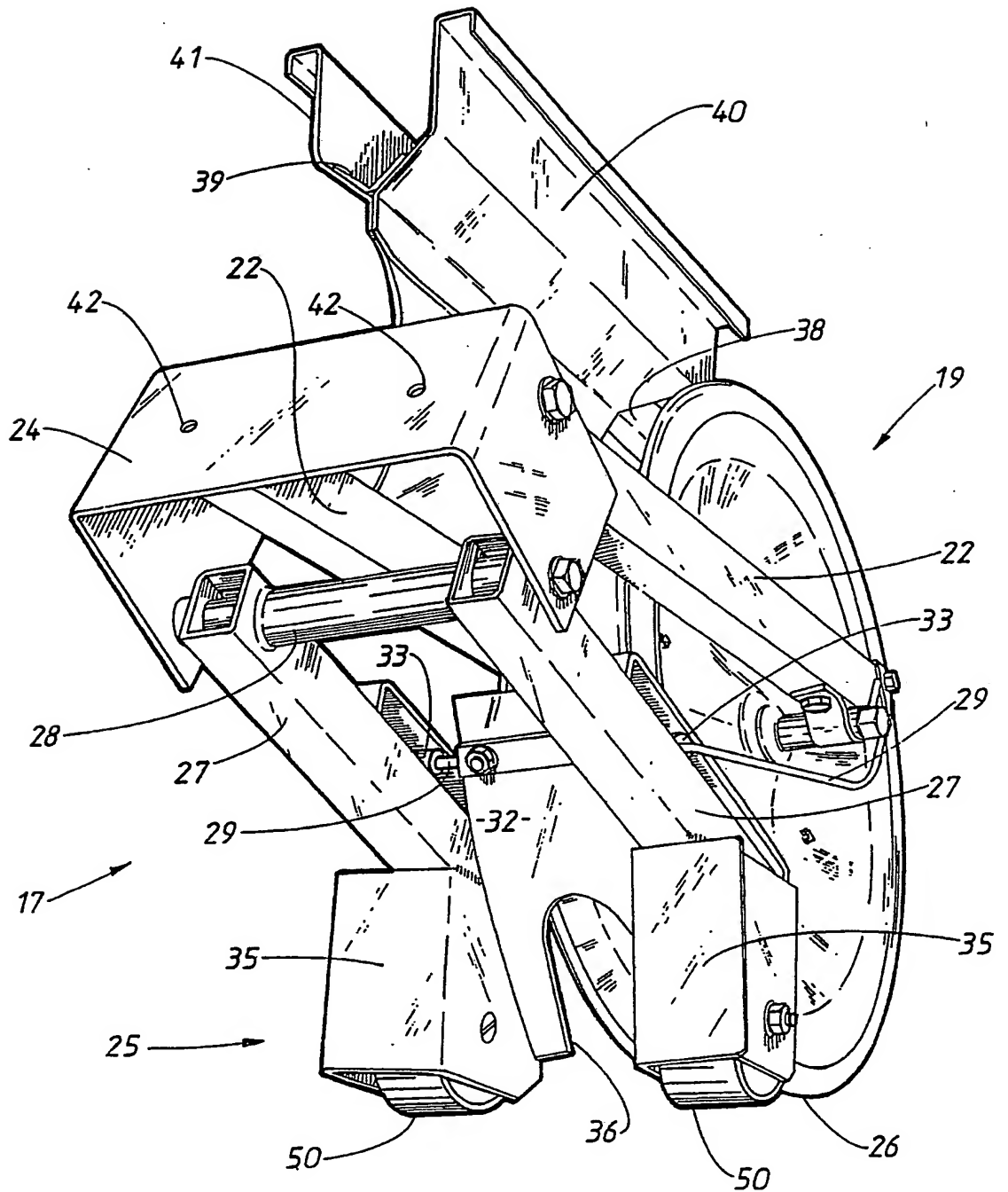
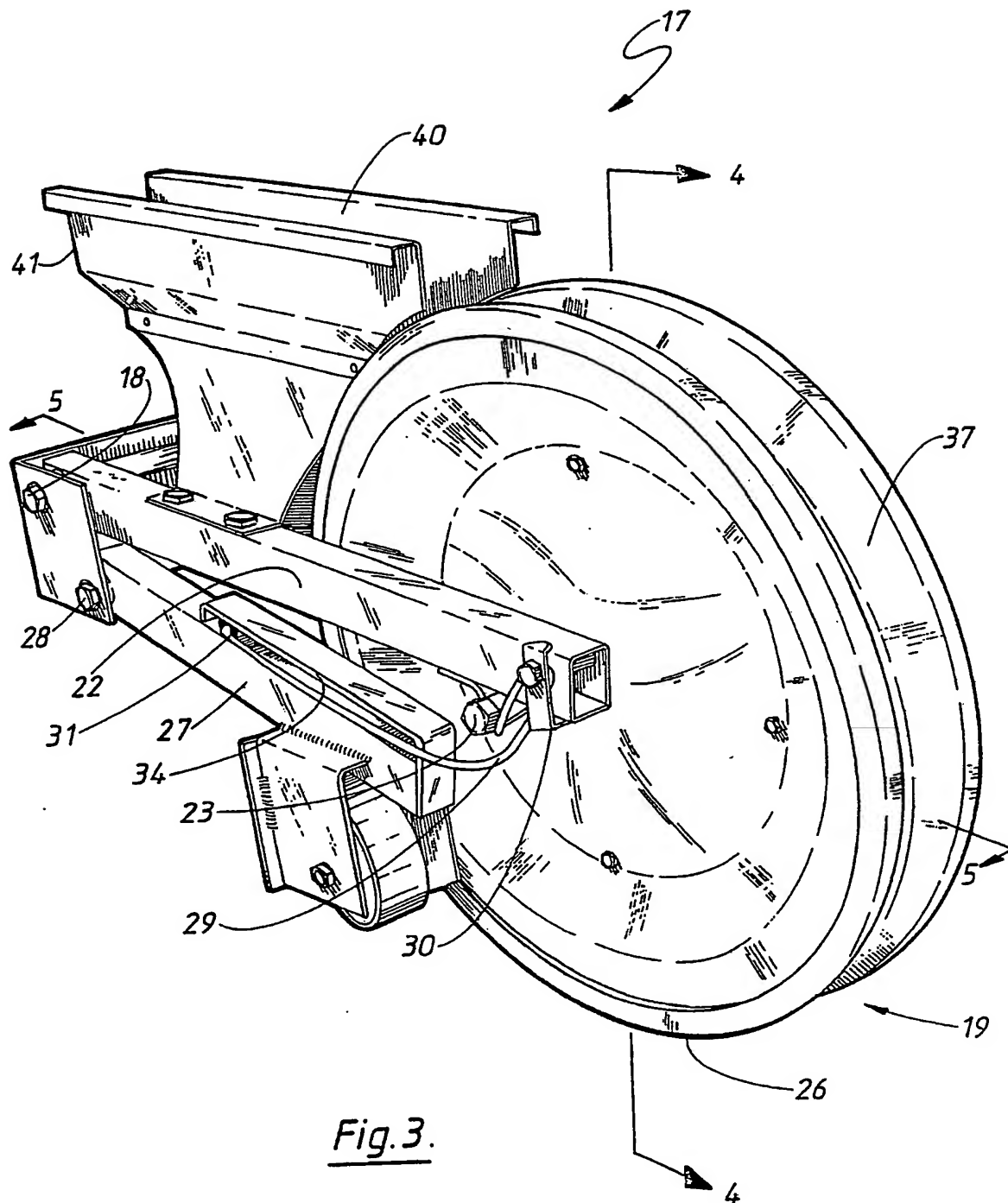


Fig. 2.



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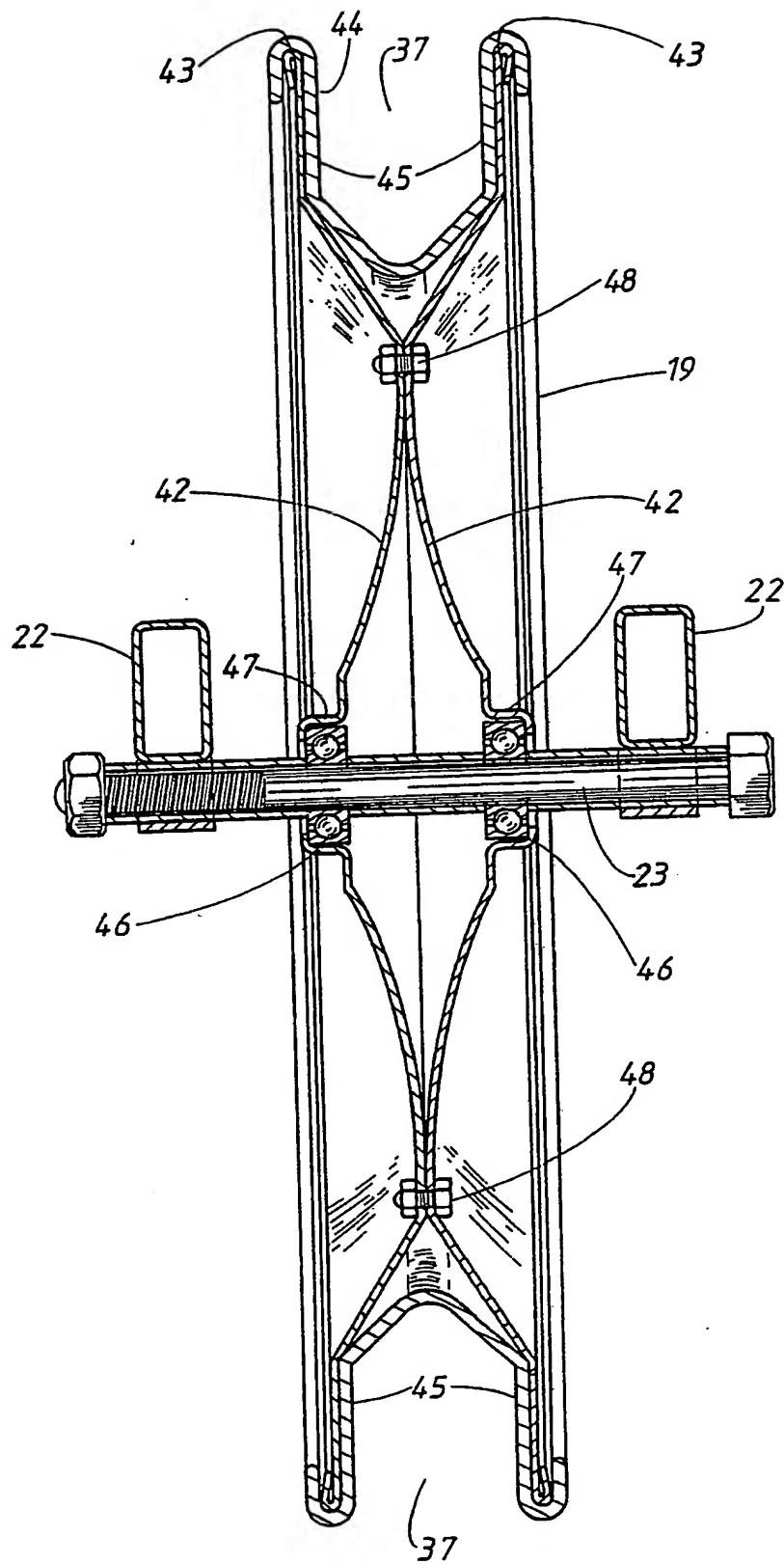


Fig. 4.

Fig. 5

